

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference M80845702:RNM	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/AU2005/000404	International filing date (day/month/year) 21 March 2005	Priority date (day/month/year) 19 March 2004	
International Patent Classification (IPC) or national classification and IPC Int. Cl. G06F 17/50 (2006.01)			
Applicant THE AUSTRALIAN STEEL COMPANY (OPERATIONS) PTY LTD et al			

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of 8 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>
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Date of submission of the demand 12 January 2006	Date of completion of this report 22 June 2006
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Box No. I Basis of the report

1. With regard to the language, this report is based on:

The international application in the language in which it was filed

A translation of the international application into _____, which is the language of a translation furnished for the purposes of:

- international search (under Rules 12.3(a) and 23.1 (b))
- publication of the international application (under Rule 12.4(a))
- international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

the international application as originally filed/furnished

the description:
pages 1,3,4,6-20,22-32 as originally filed/furnished
pages* received by this Authority on with the letter of
pages* 2,5,5A,21 received by this Authority on 13 April 2006 with the letter of 13 April 2006

 the claims:

pages 34 as originally filed/furnished
pages* as amended (together with any statement) under Article 19
pages* received by this Authority on with the letter of
pages* 33,35-37 received by this Authority on 13 April 2006 with the letter of 13 April 2006

 the drawings:

pages 1/16-16/16 as originally filed/furnished
pages* received by this Authority on with the letter of
pages* received by this Authority on with the letter of

 a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.3. The amendments have resulted in the cancellation of:

the description, pages
 the claims, Nos.
 the drawings, sheets/figs
 the sequence listing (specify):
 any table(s) related to the sequence listing (specify):

4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages
 the claims, Nos.
 the drawings, sheets/figs
 the sequence listing (specify):
 any table(s) related to the sequence listing (specify):

* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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1. Statement

Novelty (N)	Claims	YES
	Claims 1-24	NO
Inventive step (IS)	Claims	YES
	Claims 1-24	NO
Industrial applicability (IA)	Claims 1-24	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

D1 = MultiREBAR BS8666:2000 News. See URLs:

<http://web.archive.org/web/*/http://www.multisuite.com/multirebar_bs8666_2000_news.htm>
 <http://web.archive.org/web/20040225203152/http://www.multisuite.com/multirebar_bs8666_2000_news.htm>

CAD User UK Back Issues. See URLs:

<http://www.caduser.com/reviews/reviews.asp?a_id=158><http://web.archive.org/web/20040301085108/http://www.caduser.com/reviews/reviews.asp?a_id=158>

Acumis Technology – Products. See URLs:

<http://web.archive.org/web/*/http://www.acumis.com/multisuite.htm><<http://web.archive.org/web/20021126151049/http://www.acumis.com/multisuite.htm>>

D2 = RebarMate - See brochure at URLs:

<http://web.archive.org/web/*/http://www.technocad.co.za/_private/pdf/RebarMate%20Brochure.pdf>
 <http://www.technocad.co.za/_private/pdf/RebarMate%20Brochure.pdf>

D3 = GEOPAK REBAR - See brochure at URLs:

<http://web.archive.org/web/*/http://www2.bentley.com/files/products/tech_profiles/GEOPAKRebar_tech_profile.pdf>
 <http://web.archive.org/web/20030709124526/http://www2.bentley.com/files/products/tech_profiles/GEOPAKRebar_tech_profile.pdf>

D4 = DIAMOND –CAD for the professional. See URLs:

<http://web.archive.org/web/*/http://www.asacad.co.uk/man10.htm>
 <<http://web.archive.org/web/20040215065245/http://www.asacad.co.uk/rc.htm>>
 <<http://web.archive.org/web/20031217122216/http://www.asacad.co.uk/man10.htm>>

D5 = CADserver – Article viewer (CADrebar). See URLs:

<http://web.archive.org/web/*/http://www.cadserver.co.uk/common/viewer/archive/2002/Apr/9/feature25.phtm>
 <<http://web.archive.org/web/20040222140503/http://www.cadserver.co.uk/common/viewer/archive/2002/Apr/9/feature25.phtm>>

New Citation

D6 = CADserver – Article viewer (Allplot). See URLs

<http://web.archive.org/web/*/http://www.cadserver.co.uk/common/viewer/archive/2003/Mar/18/feature2.phtm>
 <<http://web.archive.org/web/20040222163624/http://www.cadserver.co.uk/common/viewer/archive/2003/Mar/18/feature2.phtm>>

D7 = MultiREBAR quick tour. See URL:

<http://web.archive.org/web/*/http://www.multisuite.com/multirebar_quick_tour.htm>
 <http://web.archive.org/web/20031209121011/http://www.multisuite.com/multirebar_quick_tour.htm>

Note: Continuation in Supplemental Box I.

Supplemental Box I Continuation of: Box No. V. 2. Citations and explanations

D8 = MasterSeries Softwares. See URL:

<http://web.archive.org/web/*/http://www.masterseries.com>
<<http://web.archive.org/web/20040131163106/http://masterseries.com/>>

D9 = Oasys: CADrebar Features. See URL:

<http://web.archive.org/web/*/http://www.oasys-software.com>
<<http://web.archive.org/web/20031210031422/www.oasys-software.com/product/cad/cadrebar/features.shtml>>
<http://web.archive.org/web/20031210030054/www.oasys-software.com/product/cad/cadrebar/faq_gen.shtml>

Novelty (N): Claims 1-24

The independent claims in general relate to an arrangement for the automatic scheduling of bars which include a database of stored default reinforced product parameters, the reception in electronic form of a drawing containing characterisations for reinforcing bars, the detection of these characterisations and the generation of a bar schedule using the characterisations and the database.

It is observed that the means of reception of a drawing is not limited to any specific mode and therefore the drawings may be received in electronic form from a detailer's entries via a graphical user interface, from discs or from an export action etc. Hence, the subject matter of the claims lacks novelty in light of the system in most of the above citations that is capable of receiving drawings and reinforcing details in electronic form and automatically recognising reinforcing details in order to create a bar schedule.

Citation D1 (MultiREBAR BS8666:2000 News) is relevant because it includes:

a) Storing reinforced product parameters in database.

Citation D1 (page 3 of 5) discloses designs that are based on BS4466 and on MultiREBAR's database of bar shapes etc. According to claim 16, default bar shapes are considered product parameters. Hence, MultiREBAR does feature storing reinforced product parameters.

b) automatically detecting reinforced product properties from a drawing of a reinforced product.

Citation D1 (pages 1 of 5, 3 of 5 and 4 of 5) discloses that imported or existing BS4466 drawings can be converted to BS8666 2000. MultiREBAR detects product properties peculiar to BS4466 (eg shape codes, bending radii, dimensions, cut lengths etc) for conversion to the new BS8666 2000 thereby allowing bars to be detailed to the latest standard. Hence MultiREBAR does feature the detection of product properties.

c) using product parameters and detected properties to generate a bar schedule.

As MultiREBAR is a bar detailing and scheduling application (page 1 of 5), this feature is also anticipated.

According to the description (page 8 lines 2 to 4) a drawing in electronic form includes drawing having a .dwg or .dxf format compatible with most common applications, for example AutoCAD systems. Citation D1 discloses the reception of electronic drawing in .dxf format. The system in citation D1 receives such drawing to BS4466 standard in .dxf format by importing them. According to the description (page 7 lines 27 to 29), an engine acts to "read" engineering drawings and recognise various properties of ... reinforced bars used ... The system in citation D1 is able to "read" electronic drawings in .dxf format and recognise from these drawing bar properties under BS4466 that are and that are not catered for under BS8666. Bar properties (eg shapes) under BS4466 that are catered for under BS8666 are converted to the new standard. Hence, citation D1 discloses a system that reads electronic drawings and detects or recognises bar shape codes, bending radii and dimensions to BS4466 that require conversion to BS8666 standard. It is also noted that the system in citation D1 imports (receives) drawings/designs to BS4466 (eg Staad Pro/QSE file in .dxf format) and converts them to BS8666 (in citation D1, the results of such a conversion is shown in tables).

Such disclosures render the arrangement in the independent claims not novel. The features in the dependent claims are generally disclosed when the disclosures in citation D1 and D7 are taken as a single source of disclosures.

Note: Continuation in Supplemental Box II

Supplemental Box II Continuation of: Box No. V. 2. Citations and explanations

Citation D2, as a second example, discloses a software arrangement (RebarMate) for reinforced concrete detailing and scheduling purposes. RebarMate is capable of accepting (receiving) drawing and bar details in electronic form that are entered by a detailer. It is noteworthy that all bars and bar details are extracted directly from the drawing in order to create a bar bending schedule to BS or SABS standard. RebarMate therefore detects and recognises bar details for extraction purposes. In addition, a default product parameter database is also disclosed in that the schedule is generated to either BS, SABS or other codes with specific cutting length formula (product parameters). Such disclosures render the arrangement in the claims as a whole not novel.

Citation D3, as a third example, discloses a method of scheduling reinforcing bars including:

a) storing defaults reinforced product parameters in a database.

Citation D3 discloses that "lap lengths, concrete strengths, bar diameters, steel designations, standard bend sizes and the Bar Shape library are all preset to your specified detailing standard". Hence, feature (a) is disclosed.

b) detecting reinforced product properties from reinforced product drawings.

According to citation D3, one may "draw any concrete detail....and the software will store it... in your Object Library". According to the citation, "details saved to your Object Library under English units can be retrieved at a later date without adjustment into Metric metric drawings" ie "reinforcement details created under one unit can be automatically converted to another unit and vice versa" and that "labels, dimensions, bar lengths, bar masses, and bar charts are automatically adjusted during the conversion".

Hence, the automatic detection of reinforced product properties (properties as per claims 5 and 6 of the application for example) are disclosed.

c) using stored reinforced product parameters reinforced product properties to generate bar scheduling data.

(i) According to citation D3, the above preset lap lengths, concrete strengths, bar diameters, steel designations, standard bend sizes and the Bar Shape library makes it easy to draw reinforcing to code. Hence the use of default product parameters in reinforcement detailing is disclosed.

(ii) Citation D3 discloses that "reinforcement detailing is automated by selecting predefined concrete details from the Object Library". According to the citation, "details created under one unit can be automatically converted to another unit and vice versa" and that "labels, dimensions, bar lengths, bar masses, and bar charts are automatically adjusted during the conversion". Hence the use of detected reinforced product properties in reinforcement detailing is disclosed.

(iii) Citation D3 discloses an "automatic Scheduling and Charting" software. According to the citation, the software "records bar marks, bar shape, and bar lengths as you perform detailing....The software tracks bar quantities and bar mark numbers....and automatically creates charts containing quantities and calculations of total weight". Hence, the generation of reinforcing bar scheduling data as detailing proceeds during the reinforcement detailing process is disclosed. Based on items (1) to (3), the use of product parameters and product properties for generating bar scheduling data is also disclosed.

The arrangement in the independent claims cannot be considered novel in the light of such disclosures. The features in the dependent claims in general are either disclosed or are inherent in the citation. For example, the feature of the reinforced products being reinforced concrete products (claim 2) is directly disclosed in citation D3. Citation D3 also discloses that "if reinforcement is drawn with incorrect cover or bar diameter" one may "make corrections bykeying in a new value" and "Rebar instantly redraws the bar shape according to the adjusted parameters" and "as details within the MicroStation drawing update automatically, so too do the scheduled quantities" that is "Rebar dynamically updates its schedules at the same time that details are updated". In view of such disclosed ability to alter bar dimensions, the features of claims 21 and 22 for example cannot be considered novel.

Note: Continuation in Supplemental Box III

Supplemental Box III Continuation of: Box No. V. 2. Citations and explanations

As a final example, the subject matter of the claims cannot be considered novel in the light of the disclosures in citations D5 and D9 which form a single source of disclosures for a CADrebar software for reinforced concrete detailing and scheduling purposes. Like the other system, CADrebar is capable of accepting (receiving) drawing and bar details in electronic form that are prepared by a detailer. CADrebar (D5) generate automatic bar-schedules utilising data which is embedded in a drawing during a detailing process. Details are extracted from the drawing to produce bar schedules to BS standard or to other codes. Hence, like RebarMate, CADrebar detects and recognises bar details for extraction purposes. In addition, a default product parameter database is also disclosed in that the schedule is generated to either BS or other codes with specific formulae and dimension definitions (product parameters). Such disclosures render the arrangement in the independent claims not novel. The features in the dependent claims are generally disclosed when the disclosures in citation D5 and D9 are taken as a single source of disclosures.

Inventive Step (IS): Claims 1-24:

As above.

Citation D8 for example discloses a "MasterKey Concrete" system for producing full RC detailed drawings either directly to a printer or via AutoCad as a dxf drawing. It also discloses that dxf exported drawings may be scheduled using the MasterRC Scheduler (to BS4466 or BS 8666). This citation discloses many structures and situations that may benefit from automatic detailing and scheduling softwares in general. The subject matter of the claims as a whole lacks an inventive step when such disclosures are taken in combination with any of the other citations.

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generated by the software tools. When each reinforcing steel bar is electronically drawn, the software tool records the shape and specified dimensions of the reinforcing steel bar in order that a list of all reinforcing bars used in the design of the reinforced concrete structure can be generated. Whilst such a system

5 improves the efficiency of a completely manual scheduling process, it is nevertheless inflexible and requires the software tool to be used during the entirety of the scheduling process. Such software tools are typically expensive and not in widespread use. Moreover, existing software tools are only able to be used when all of the steps involved in the scheduling of reinforcing steels bars are performed

10 on the software tools themselves.

It would therefore be desirable to provide a method and system of scheduling reinforcing bars for use in reinforced products that ameliorate or overcome one or more disadvantages of known scheduling systems and methods.

It would also be desirable to provide a method and system of scheduling

15 reinforcing bars for use in reinforced products that improve the efficiency of the scheduling process and are compatible for existing scheduling operations.

With this in mind, one aspect of the invention provides an automated method of scheduling reinforcing bars for use in reinforced products, the method including the steps of:

20 storing default reinforced product parameters in a database;

receiving in electronic form one or more drawings containing reinforced product properties including one or more characterisations for at least one reinforcing bar in the reinforced product;

25 in a database engine, reading said drawing(s) including said characterisation(s) in the drawings, thereby detecting said reinforced product properties including said one or more characterisations for at least one reinforcing bar in the reinforced product; and

using the stored reinforced product parameters and detected reinforced product properties to generate reinforcing bar scheduling data.

30 The reinforced products may be reinforced concrete products, including any one or more of a concrete slab, beam, column, wall, stair, tilt panel, coupler, top hat, bar chair and laser bar.

for the creation of marking plans along with other schedule data that is produced from a combination of scanning existing element data while also following a set of user defined rules.

Another aspect of the invention provides an automated system for
5 scheduling reinforcing bars for use in reinforced products, the system including:

a database for storing default reinforced product parameters; and

a database engine for reading one or more reinforced product drawings and automatically detecting one or more reinforced product properties, including one or more characterisations for at least one reinforcing bar in the reinforced product,
10 wherein the database engine uses the stored reinforced product parameters and detected reinforced product properties to generate reinforcing bar scheduling data.

Yet another aspect of the invention provides a computer program element for use in an automated system for scheduling reinforcing bars for use in reinforced products, the computer program element including a series of
15 instructions for causing a database engine to:

receive in electronic form one or more drawings containing reinforced product properties including one or more characterisations for at least one reinforcing bar in the reinforced product;

reading said drawing(s) including said characterisation(s) in the drawings,
20 thereby detecting said reinforced product properties including said one or more characterisations for at least one reinforcing bar in the reinforced product; and

using the reinforced product parameters stored in a database, and the detected reinforced product properties, to generate reinforcing bar scheduling data.

The following description refers in more detail the various features of the invention. To facilitate and understand the invention reference is made in the description to the accompanying drawings where the method and system of the schedule reinforcing bars for use in reinforced products is illustrated in a preferred embodiment. It is to be understood that the invention is however not limited to the preferred embodiment as illustrated in the drawings.

In the drawings:

covering all bars with mesh and chair requirements calculated. Once again, the database engine 12 derives drawing intelligence from engineering drawings to obtain the following information:

- panel size dimensions of height, width, thickness and any openings

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- reinforcing location requirements, for instance, the panel may have reinforcing centrally located on both faces
- the identifiable faces of the panel, being its "near face" and "far face" to help determine bar chair type and heights, including cover requirements

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- reinforcing mesh requirements including the extent of mesh to each face should bar/mesh combinations be required
- extent of reinforcing trimmer bars to the edge of panels
- each type of information derived from scanner intelligence obtained by the database engine 12 is illustrated in Figures 41 and 42.

15 Figure 44 provides an overview of the scheduling process performed by the scheduling system 10 shown in Figure 1. Initially, at step 100, a scheduler receives job documentation, including various project requests and constraints. At step 101, these parameters and constraints are entered by the scheduler into the parameters database 14 via the database engine 12. If, at step 102, it is determined that electronic drawings have been provided by a customer, then, if it is determined at step 103 that the electronic drawings are in a .dwg or .dxf format, then those electronic drawings are reviewed at step 104 by the scheduler. If the electronic drawings are not in an appropriate format, the drawings are converted at step 105 into an appropriate format at a local workstation. If the drawings are not in electronic format, if it is determined at step 106 that the drawings are to scale and of adequate integrity, then, at step 107, the hard copy drawings are converted into a .dwg file by using raster to vector imaging. If drawings are not to scale or of adequate integrity, a schedule bar listing and manual scheduling are

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CLAIMS:

1. (amended) An automated method of scheduling reinforcing bars for use in reinforced products, the method including the steps of:
 - storing default reinforced product parameters in a database;
 - 5 receiving in electronic form one or more drawings containing reinforced product properties including one or more characterisations for at least one reinforcing bar in the reinforced product;
 - in a database engine, reading said drawing(s) including said characterisation(s) in the drawings, thereby detecting said reinforced product
 - 10 properties including said one or more characterisations for at least one reinforcing bar in the reinforced product; and
 - using the stored reinforced product parameters and detected reinforced product properties to generate reinforcing bar scheduling data.
2. A method according to claim 1, wherein the reinforced products include
 - 15 reinforced concrete products, including any one or more of a concrete slab, beam, column, wall, stair, tilt panel, coupler, top hat, bar chair and laser bar.
3. A method according to either one of claims 1 or 2, wherein the reinforced product properties include any one or more of the outline of the reinforced product, the extent of the reinforced product and any penetrations of the reinforced product.
- 20 4. A method according to any one of the preceding claims, wherein the reinforced product properties include steps in one or more surfaces of the reinforced product, including any visible and hidden steps in the reinforced product.
5. A method according to any one of the preceding claims, wherein the reinforced product properties include text characterising one or more of the reinforcing bars.
- 25 6. A method according to claim 5, wherein the text characterises the dimensions of reinforcing bars or the spacing between reinforcing bars.

reinforced product parameters include the bottom or top cover of the reinforced product.

15. (amended) A method according to any one of the preceding claims, wherein the default reinforced product parameters includes bar overlap lengths.
- 5 16. A method according to any one of the preceding claims, wherein the default reinforced product parameters include default bar shapes or dimensions.
17. A method according to any one of the preceding claims, the method further including the step of:
 - selecting one or more zones within the one or more reinforced product drawings to carry out reinforcing bar scheduling.
 - 10 18. A method according to claim 17, wherein each zone corresponds to separately constructed portion of the reinforced product.
 19. A method according to claim 18, wherein at least one separately constructed portion is a separately poured section of a reinforced concrete product.
 - 15 20. A method according to any one of the preceding claims, the method further including the step of:
 - at a display terminal, displaying the reinforcing bar scheduling data.

21. A method according to any one of the preceding claims, the method further including the step of:

rationalising the reinforcing bars for use in the reinforced products.

22. A method according to claim 21, wherein the step of rationalising the
5 reinforcing bars includes:

selecting reinforcing bars having dimensions within a predefined tolerance;
and

re-labelling the selected reinforcing bars within the same dimensions on the
reinforced product drawings.

10 23. (amended) An automated system for scheduling reinforcing bars for use in
reinforced products, the system including:

a database for storing default reinforced product parameters; and

a database engine for reading one or more reinforced product drawings and
automatically detecting one or more reinforced product properties, including one or
15 more characterisations for at least one reinforcing bar in the reinforced product,
wherein the database engine uses the stored reinforced product parameters and
detected reinforced product properties to schedule reinforcing bars for use in
reinforced products in accordance with any one of the preceding claims.

20 24. (amended) A computer program element for use in a computerised system
for scheduling reinforcing bars for use in reinforced products, the computer
program element including a series of instructions for causing a database engine
to:

receive in electronic form one or more drawings containing reinforced
product properties including one or more characterisations for at least one
25 reinforcing bar in the reinforced product;

reading said drawing(s) including said characterisation(s) in the drawings, thereby detecting said reinforced product properties including said one or more characterisations for at least one reinforcing bar in the reinforced product; and

using the reinforced product parameters stored in a database, and the
5 detected reinforced product properties, to generate reinforcing bar scheduling data.